

## CLAIMS

### WE CLAIM:

1. A connector assembly comprising:
  - a male member having a circumferential external shoulder on an outer surface thereof;
  - a female member having a cavity defined by an inner circumferential wall for receiving the male member, the cavity extending from a first end to an interior portion of the female member, the circumferential wall defining an internal shoulder, the tubular female member having a circumferential external shoulder on an outer surface thereof; and
  - a retainer member surrounding a portion of the male member, the retainer member including a plurality of circumferentially spaced resilient internal retainer arms and an annular external retainer flange, the external flange being radially spaced from the internal retainer arms and connected thereto by a radial joining member, the internal retainer arms each having a distal end for simultaneously engaging the male member external shoulder and the female member internal shoulder when the male member is within the female member, the external flange having a distal end defining a radially inwardly extending protrusion for engaging the female member external shoulder when the male member is within the female member.
2. The connector assembly of claim 1 wherein the external flange includes a plurality of axial openings dividing the external flange into a plurality of resilient axially extending external retainer fingers each having a radially inwardly extending lip for engaging the female member external shoulder.
3. The connector assembly of claim 1 wherein at least two semi-circumferential tooling openings are formed through the external flange near the radial joining member for receiving opposed ends of a removal tool.
4. The connector assembly of claim 1 wherein the joining member is disc shaped having a central opening through which the male member extends, the joining member

having a first surface for engaging the first end of the female member.

5. The connector assembly of claim 4 wherein the joining member includes a resilient sealing flange extending axially therefrom and surrounding the central opening for engaging the male member.

6. The connector assembly of claim 1 wherein the distal ends of the internal retainer arms are adapted to be compressed between the male member external shoulder and the female member internal shoulder when the male member is within the female member to create an interference fit therebetween.

7. The connector assembly of claim 1 wherein the distal ends of the internal retainer arms are angled radially outward and each include opposite facing first and second surfaces for engaging the male member external shoulder and the female member internal shoulder, respectively.

8. The connector assembly of claim 1 wherein the retainer member is formed as a unitary structure from resilient plastic.

9. The connector assembly of claim 1 wherein the outer surface of the female member is defined by an outer annular wall having a first section and a second section, the first section being located between the first end and the second section and having an outer diameter greater than that of the second section, a transition between the first portion and the second portion defining the female member external shoulder, wherein the external flange extends axially along the first portion.

10. The connector assembly of claim 9 wherein the outer annular wall includes a third section that extends from the first end to the first section, the diameter of the third section increasing from the first end to the first section of the first end for expanding the distal end of the external flange radially outward as the retainer member 10 is slid onto the female

member.

11. The connector assembly of claim 1 wherein the internal circumferential wall includes an annular groove formed therein and having first and second substantially opposed sides, the first side being closer to the first end than the second side, the first side defining the female member internal shoulder.

12. The connector assembly of claim 11 wherein the second side of the annular groove defines a further female member internal shoulder for engaging the male member external shoulder to prevent insertion of the male member into the female member beyond a predetermined point.

13. The connector assembly of claim 1 wherein the joining member includes a central opening through which the male member extends, and the male member includes a further circumferential external shoulder on the outer surface thereof in a location that is on an opposite side of the central opening than the female member when the male member is within the female member, the further circumferential external shoulder having a diameter larger than that of the central opening.

14. The connector assembly of claim 13 wherein the joining member includes a resilient sealing flange about a circumference of the central opening and extending axially towards the further circumferential external shoulder.

15. The connector assembly of claim 1 wherein the external flange extends a greater axial distance from the joining member than the internal retainer arms.

16. A connector assembly including:  
a tubular male member having an increased diameter circumferential portion;  
a tubular female member having an inner annular wall defining a cavity opening at a first end of the female member for receiving the male member, the inner annular wall

having an annular groove formed therein and spaced apart from the first end, the female member having an outer annular wall; and

a retainer member for releasably joining the male member to the female member, the retainer member including a plurality of resilient interior retainer arms having end portions adapted to simultaneously engage the increased diameter circumferential portion and a side of the annular groove when the male member is joined to the female member to create an interference fit therebetween, the retainer member including an outer annular flange spaced radially apart from the interior retainer arms and adapted to engage the female member outer annular wall when the male member is joined to the female member, the interior retainer arms being joined to the outer annular flange by a joining member through which the male member extends, the joining member being adapted to engage the female member first end when the male member is joined to the female member.

17. The connector assembly of claim 16 wherein a diameter of the female member outer annular wall decreases at circumferential shoulder that is spaced apart from and faces a substantially opposite direction than the first end, the outer annular flange of the retainer member including a radially inward projection at an end thereof adapted to engage the circumferential shoulder when the male member is joined to the female member.

18. The connector assembly of claim 17 wherein the outer flange includes a plurality of semi-circular circumferentially spaced resilient outer retainer arms, the radially inward projection including a lip on each of the outer retainer arms.

19. The connector assembly of claim 18 wherein the outer retainer arms are adapted to radially deflect outwards when passing over the female member outer wall.

20. A retainer member for releasably securing a tubular male member and a tubular female member, the male member having an increased diameter circumferential portion, the female member having an inner annular wall defining a cavity opening at a first end of the female member for receiving the male member, the inner annular wall having an

annular groove formed therein and spaced apart from the first end, the female member having an outer annular wall, the retainer member including:

interior retainer means for insertion within the cavity and for simultaneously engaging the increased diameter circumferential portion and a side of the annular groove when the male member is joined to the female member; and

an outer retainer means spaced radially apart from the interior retainer means for engaging the female member outer annular wall when the male member is joined to the female member.

21. The retainer member of claim 20 wherein a diameter of the female member outer annular wall decreases at circumferential shoulder that is spaced apart from and faces a substantially opposite direction than the first end, the outer retainer means including a radially inward projection at an end thereof adapted to engage the circumferential shoulder when the male member is joined to the female member.

22. The retainer member of claim 21 wherein the interior retainer means includes a plurality of circumferentially spaced resilient internal retainer arms and the outer retainer means includes an annular external retainer flange radially spaced from the internal retainer arms and connected thereto by a radial joining member, the internal retainer arms each having a distal end for simultaneously engaging the male member increased diameter circumferential portion and the side of the female member annular groove when the male member is within the female member, the external retainer flange having at least two semi-circumferential tooling openings formed there-through near the joining member for receiving opposed ends of a removal tool.

23. A retainer member for releasably securing a male member to a female member, the retainer member including:

a joining member having a central opening;

a plurality of circumferentially spaced resilient internal retainer arms extending from a first side of the joining member and arranged around the central opening thereof; and

an annular outer flange extending from the first side of the joining member and radially spaced outward from the internal retainer arms, the outer flange having a distal end remote from the joining member defining an radially inwardly extending protrusion.

24. The retainer member of claim 23 wherein at least two semi-circumferential tooling openings are formed through the outer flange near the joining member for receiving opposed ends of a removal tool.

25. The retainer member of claim 23 wherein at least portions of the internal retainer arms and the outer flange are coated with a friction reducing material layer.